

**LECTURE NOTE ON
CVE 305 (STRUCTURAL ANALYSIS I)
Course Unit 3**

Course Lecturer: Engr. Akinyele J.O

Duration for lecture: 2 hours per week
(15 weeks)

Duration for Practical : 3 hours per
week

COURSE OBJECTIVES

- Students should be able to differentiate between determinate and indeterminate structures.
- Develop the method of solving determinate structures like beams, arches, frames and trusses.
- Ability to solve indeterminate structures using virtual work and energy methods.

Types of indeterminacy (Week 1)

- External indeterminacy: If the total number of reactions in a structure exceed the number of the equation of equilibrium applicable to the structure.
- Internal indeterminacy: This can be define by the following equations: $M=2j-r$, (determinate and stable), If $M>2j-r$, (Indeterminate and stable), If $M<2j-r$, (Unstable)
- External and Internal Redundancy: This can be determined by this equation : $D=m+r-2j$ (for pin and roller supports), and $D=3n+r-3j$ (for rigidly joined frames).
- M =members, j =joints, r =reaction at supports.

Methods of Analysis for Frames and Trusses (5 weeks)

- Virtual work method (Week 2)
- Method of tension coefficients (Week 3)
- Method of sections (Week 4)
- Method of joint resolution of forces (Week 5)
- Energy method (Week 6)